MONTANA'S PROPOSED NUTRIENT CRITERIA

The following are extracts from DEQ's white paper providing key summary information related to the proposed nutrient criteria (yellow highlights added).

Summary of Recommendations

- Omernik ecoregions[60] should be used as the basis for applying the criteria across Montana. Ecoregions at the level III scale should at this time be used as the principal means of applying the criteria. However, level IV (fine-scale) ecoregions should be used where warranted. This is particularly true for streams in the mountain-to-prairie transitional areas of the state. Before level IV ecoregions are selected for application of specific nutrient criteria, they should be subjected to the series of screening evaluations in Section 7.4 to assure that the segregation is appropriate.

- Criteria should be established for total nitrogen (TN), total phosphorus (TP), and nitrate + nitrite (NO_{2+3}). In some streams (detailed below), stream-bottom algae levels should also be included as criteria. Using appropriate statistical evaluation methods and sufficiently-sized datasets (minimum of 12 for each nutrient), compliance with nutrient criteria should be undertaken using a 20% allowable exceedence rate. Details on these statistical assessment methods are provided in appendix H and I of another document[58]. Stream benthic algae levels should be sampled and analyzed using DEQ Standard Operating Procedures.

- Nutrient criteria should be established as a function of the regionally applicable reference streams. Analysis shows that nutrient concentrations among the upper percentiles (e.g., 75th to 90th) of reference stream nutrient-concentration frequency distributions correspond to concentrations that scientific studies show impact water quality and beneficial uses. The advantage of linking the stressor-response derived criteria to the regional reference distribution is that it assures that inherent, regional landscape effects on background nutrient concentrations will be reflected in the criteria. This helps to assure that the criteria are not overly stringent or insufficiently protective.

- Across all parts of the state, the criteria (nutrients and benthic algae) should apply during the Growing Season (i.e., generally during the summer). The start and end dates of the Growing Season vary somewhat by ecoregion; see Table 4.1 for details.

- Streams in the mountainous level III ecoregions (Northern Rockies, Canadian Rockies, Middle Rockies, and Idaho Batholith) should have TN and TP as numeric nutrient criteria. The nutrient criteria should be established as the 90th

percentile of the applicable ecoregion's reference nutrient-concentration distribution. Benthic (i.e., stream-bottom) algae levels should be maintained ≤ 150 mg Chl *a*/m^2 (36 g AFDW/m^2). Level IV ecoregions that are separated out from any of the mountainous level III ecoregions listed here should also have the benthic algae criterion listed above, and nutrient criteria set at the 90th percentile of the level IV ecoregion's nutrient reference distribution. [Comment Added: The proposed nutrient criteria are established for mountainous streams to protect recreational uses.]

- Streams in the level III prairie ecoregions (Northwestern Glaciated Plains and Northwestern Great Plains) should have TN, TP, and probably NO_{2+3} as well, as numeric nutrient criteria. The nutrient criteria should be established as the 75th percentile of the applicable ecoregion's reference nutrient-concentration distribution. This should maintain dissolved oxygen levels at state standards. Level IV ecoregions that are separated out from these level III ecoregions should also have nutrient criteria concentrations set at the 75th percentile of the applicable level IV ecoregion's nutrient reference distribution, unless they are a mountain-to-prairie transitional ecoregion (discussed in the next bullet). The proposed nutrient criteria are established for mountainous streams to protect aquatic life uses.]

- Mountain-to-prairie transitional streams found in the level IV ecoregions Pryor-Bighorn Foothills, Limy Foothill Grassland, Rocky Mountain Front Foothill Potholes, Non-calcareous Foothill Grassland, and Foothill Grassland should have TN and TP as numeric nutrient criteria. Benthic (i.e., stream-bottom) algae levels should be maintained ≤ 150 mg Chl *a*/m^2 (36 g AFDW/m^2). The nutrient criteria should be established as the 80th percentile of the applicable level IV ecoregion reference distribution *IF* the screening conditions listed in Section 7.4 are met. If not, the nutrient criteria for these level IV ecoregions should continue to be the same as their parent level III ecoregion (Northwestern Glaciated Plains or Northwestern Great Plains).

- DEQ should continue to sample reference streams to further refine the stream nutrient reference distributions and the criteria. In particular, more nutrient samples are needed in the transitional mountain-to-prairie ecoregions. This work will assure that the criteria continue to be updated and refined. It would also be good to carry out another stressor-response study in the prairie regions of Montana, since there is only one completed at this time.

DEQ Considered the Following Elements in Developing the Proposed Nutrient Criteria

- TN:TP ratios (Redfield Ratios)
- SRP:TP
- Montana specific studies (stressor-response)
- Relevant ecoregion studies

- Other state approaches

Table 7.1 shows example nutrient criteria based on the discussions above. Not all level IV ecoregions have yet been subjected to the full evaluation in Section 7.4; only one example is provided in the table. Nutrient sampling in reference sites is ongoing and because the criteria are linked to specified percentiles in the reference distribution, the numbers shown could slightly change. As for all water quality criteria, numeric nutrient criteria will undergo periodic revision and update as more stressor-response studies are completed and more reference data is collected.

Table 7.1 Example Criteria for Different Ecoregions in Montana. Numeric Nutrient Criteria Values May Change Slightly Due to Ongoing Data Collection in Reference Sites.

		Nutrient Criteria				
Ecoregion	Period When Criteria Apply	Reference Percentile Criteria Are Based On	TN (mg/L)	TP (mg/L)	NO_{2+3} (mg/L)	Benthic Algae Criteria
Level III Ecoregions						
Northern Rockies	July 1 - Sept. 30	90th	0.23	0.01	n/a	150 mg Chl *a*/m^2 (36 g AFDW/m^2)
Canadian Rockies	July 1 - Sept. 30	90th	0.21	0.01	n/a	150 mg Chl *a*/m^2 (36 g AFDW/m^2)
Middle Rockies	July 1 - Sept. 30	90th	0.32	0.05	n/a	150 mg Chl *a*/m^2 (36 g AFDW/m^2)
Idaho Batholith*	July 1 - Sept. 30	90th	0.12	0.01	n/a	150 mg Chl *a*/m^2 (36 g AFDW/m^2)
Northwestern Glaciated Plains	June 16-Sept. 30	75th	1.31	0.12	0.02	n/a
Northwestern Great Plains	July 1 - Sept. 30	75th	1.36	0.12	0.08	n/a
Level IV Ecoregions						
Non-calcareous Foothill Grassland *(Parent Level III: Northwestern Great Plains)*	July 1 - Sept. 30	80th	0.13	0.04	Does not pass screening criteria	150 mg Chl *a*/m^2 (36 g AFDW/m^2)

*Provisional; based on only 9 samples available for each nutrient. Will be updated when $n \geq 12$.